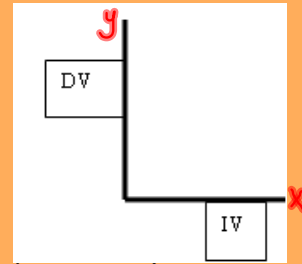


**Chapter 4**  
Modeling Functional  
Relationships

**Section 4.1**  
Tables, Graphs and  
Connections



# REVIEW



## Dependent and Independent Variables

**(Y) Dependent** -- a variable in an expression whose value depends on the independent variable.

**(X) Independent** -- A variable that is not affected by any other variables with which it is compared.



Marks depend on how much time you spend studying

INDEPENDENT

Number of plants in a garden depends on the length of your garden

For Example:

Some students collected data comparing the amount of time spent at a video arcade with the amount of money spent. Their data are shown in the table:

Amount (\$)	1.25	1.75	2.00	2.50	3.00	3.25	3.50	4.00
Time (min)	45	60	60	100	140	130	140	140

**Dependent Variable** -- The one that is affected by other factors in a relationship - Amount \$

The amount of money you spend depends on how much time you spend in the arcade.

**Independent Variable** -- The one that affects the other factors in a relationship - Time

Amount of money affects how much time you get to stay in the arcade.

The amount of money is what matters...if you run out of money you can't spend any more time in the arcade.



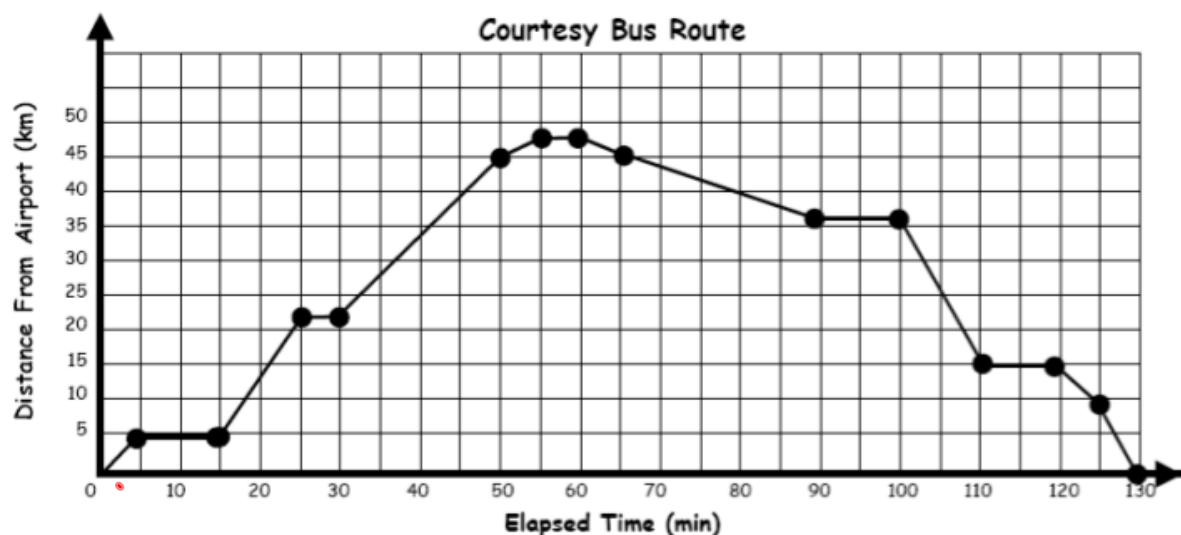
**FOCUS A**  
**Creating a Broken-**  
**Line Graph**  
**Pg.157**



# Broken-Line Graphs

A **broken-line graph** is a graph which is formed by joining data points with line segments. Broken-line graphs tell a story.

Allan landed at Halifax International Airport and took the hotel courtesy bus to his hotel. The graph below shows the distance of the bus from the airport over time. It also shows that the speed of the bus varied as it traveled along its route. These data are shown with a **broken-line graph**.



- What do the points represent?
- Describe the resulting appearance of the graph.
- • What does the highest point on the graph represent?



1) You can find the slope of the line between any two times on the graph of the bus trip.

a) What does the slope represent?

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b) How can you use the slope to describe the movement of the bus?

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2) If you look at the first half of the courtesy-bus graph, most of the slopes are positive. The slopes for the second half are mostly negative. What does this tell you about the trip?

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## Chapter 4 - Tables, Graphs and Connections

"A picture is worth a thousand words." **Graphs are a picture of data.**

In this chapter you will investigate how to create and interpret the "story" graphs are telling.

- Speed represents the change of distance over time
- Velocity is speed with a direction
- A negative velocity indicates a movement in the opposite direction.

Slope = Speed ( $m$  = "rate" of speed)

Walking Slowly (Least steep)



Walking Normally



Walking Quickly (Steepest)



Stops

$m = 0$

Positive Slopes have lines that are in an upward direction



Negative Slopes have lines that are in a downward direction





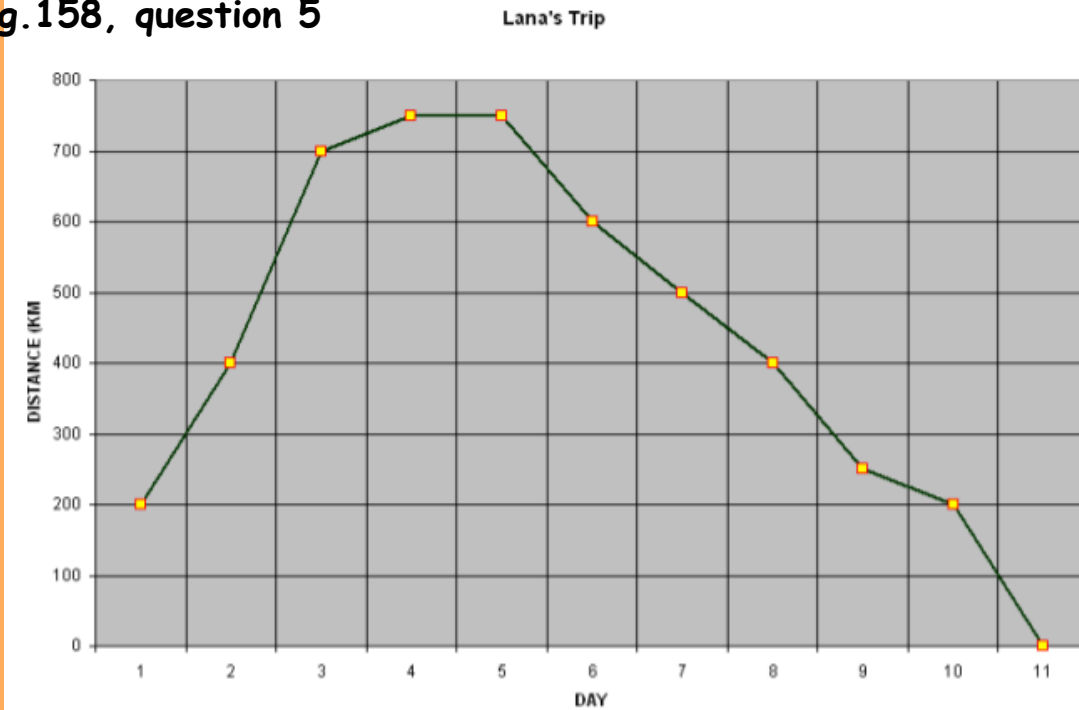
## Classwork/Homework

Pg.158 #5 and 6

(Use graph paper for #5 and don't forget to label each axis)



**Pg.158, question 5**

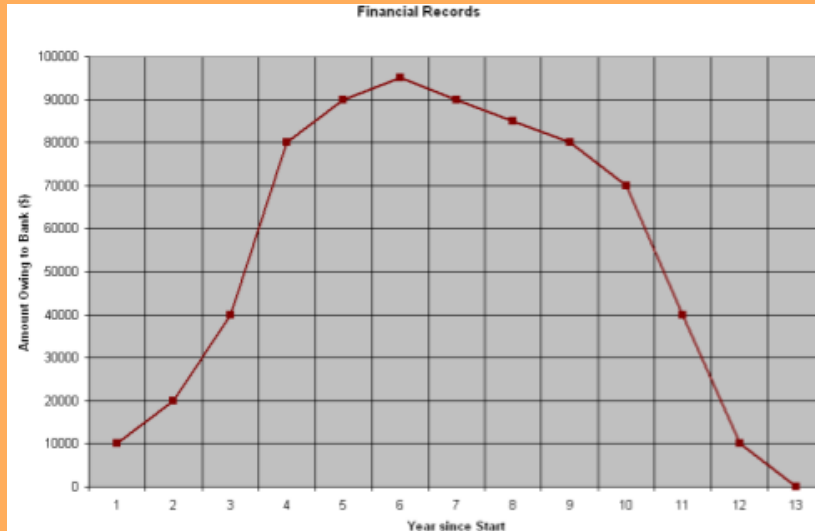


b) Possible Answer:

- During the first day Lana traveled 200km.
- She continued traveling for the next few days until, on day 3, she was 700km from home.
- During days 4 and 5, she traveled more slowly, as evidenced by the smaller slope on the graph.
- At the end of day 5, she was at her maximum distance from home.
- The negative slope between day 5 and day 6 means that Lana was returning home.
- During days 6 to 8, she moved back toward home slowly.
- On day 9, the large negative slope indicates that she was quickly heading home.
- She arrived home on day 11.



**Pg.158, question 6**



a) (i) The maximum point on the graph represents the maximum amount that Jake owed.

(ii) The slopes of the line segments indicate the "rate" at which he is borrowing.

-Large positive slopes indicate that in that period of time, he is borrowing a large sum of money.

→ (iii) A negative slope indicates that the amount that he owes is decreasing. In other words, negative slopes indicate that he is actually paying off his line of credit.

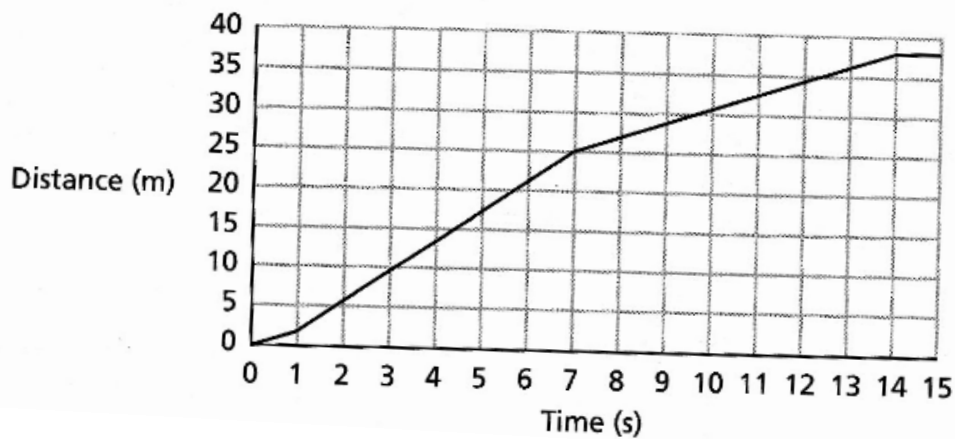
b)

- In each of the first 3 years of operation he borrowed increasingly greater sums of money.
- This trend slowed in year 4 (the maximum)
- After this time, the negative slopes indicate that he began paying back the loan.
- He made the greatest payments between 9 and 11 years.
- The loan was actually paid off in year 12.



## Practice Question #1

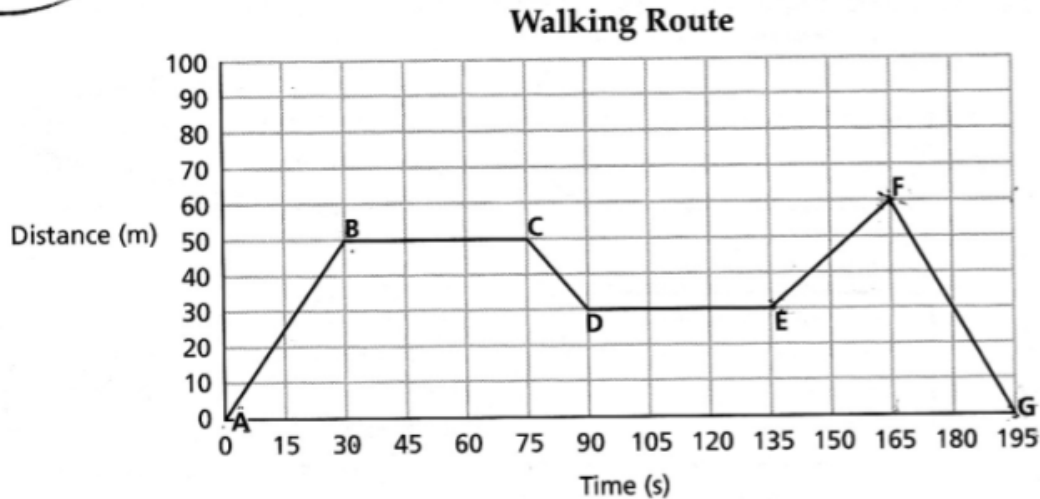
The graph below shows the distance versus time for a runner in a short race. Use your knowledge about slopes to write a description of the race for this runner.





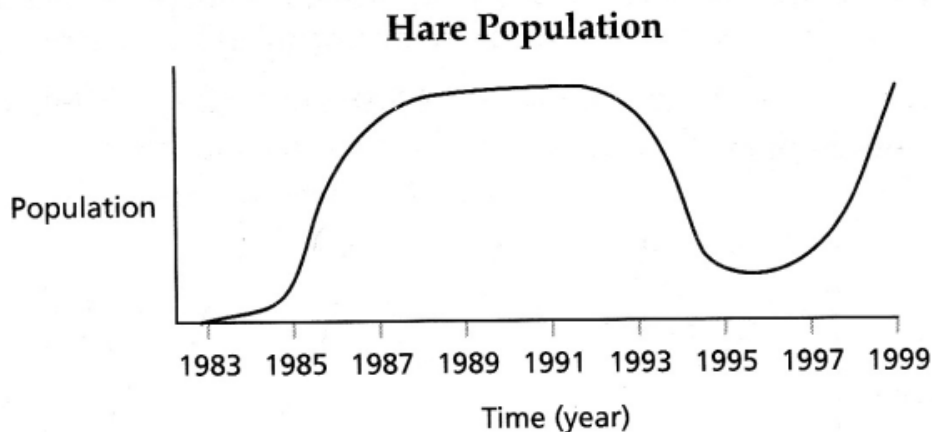
## Practice Question #2

1. Jacinta ran to buy a newspaper from the corner store. The graph below shows her distance from home at various times.



- (a) What was her fastest speed? How long did she run at this speed?  
(b) For how long was she stopped? How can you tell from the graph?

12. The graph shows the population of Arctic hares in an area that was once a mining community. With reforestation, other animals such as foxes and owls began moving into the area.



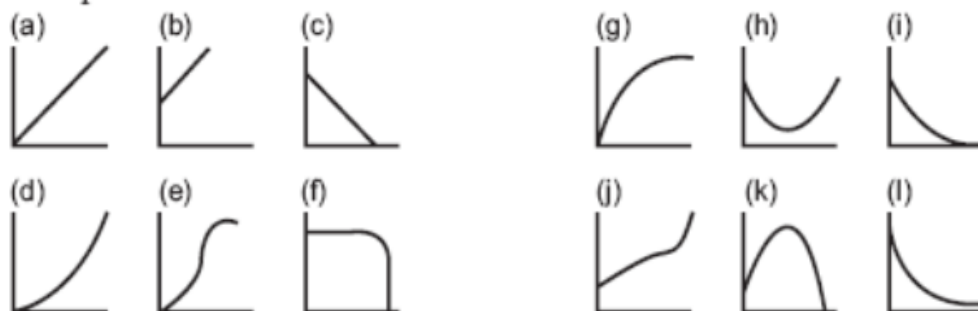
- (a) When did the hare population reach its maximum number?  
(b) When did the hare population reach its minimum number?  
(c) Write a story that explains the behaviour of the graph.



□ From the 12 graphs that follow, choose the graph that best describes each of the following situations and explain your choices.

- i) John's performance maintaining his pace running up hill
- ii) the amount of daylight, depending upon the time of the year
- iii) the cost of a taxi cab trip is \$2.00 plus \$1.00 per minute
- iv) the path of a golf ball
- ~~v) the amount of dough needed to make pizza crusts is calculated from knowing the diameter~~
- vi) a runner's strategy of starting quickly, slowing to an even pace and then sprinting toward the finish
- vii) the number of cigarettes smoked affecting your breathing in a negative way

For the graphs that remain, describe situations that could produce graphs of those shapes.





### "Matching Worksheet"

- Try your best to match a graph with each situation. You can use the same graph for more than one situation, if necessary.
- Be prepared to explain your choice.



①. G, H, f

②. J

③. L

④. K

⑤. A

⑥. B

⑦. C

K, ~~E~~, ~~I~~



**Classwork/Homework**

**Page 160 - 162**

**#8, 10, 12**